

# Submission in Response to NSF CI 2030 Request for Information

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## Research Domain, discipline, and sub-discipline

Science

## Title of Submission

Contribution from the UIC Information Technology Governance Council

## Abstract (maximum ~200 words).

Attached is combined response of various members of the UIC Information Technology Governance Council --Research Subcommittee at the University of Illinois at Chicago

**Question 1** Research Challenge(s) (maximum ~1200 words): Describe current or emerging science or engineering research challenge(s), providing context in terms of recent research activities and standing questions in the field.

Bringing researchers from multiple disciplines together to work on hard problems, and the data and hypothesis in their intersection, will be increasingly important in the coming years. These sorts of meetings can be extremely valuable, but only if the necessary data, networking, and computation are available at the participants' fingertips (or keyboards) so they can look at the data, get answers quickly, form new hypotheses, and stay in a productive cognitive state.

**Question 2** Cyberinfrastructure Needed to Address the Research Challenge(s) (maximum ~1200 words): Describe any limitations or absence of existing cyberinfrastructure, and/or specific technical advancements in cyberinfrastructure (e.g. advanced computing, data infrastructure, software infrastructure, applications, networking, cybersecurity), that must be addressed to accomplish the identified research challenge(s).

Answer 1: Most Big Iron is still accessed in batch mode and optimized for the maximum amount of computation per second. It would be

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nice if some of this infrastructure was made available for interactive work where the resources can be optimized for the maximum amount of discoveries per second, giving researchers a chance to get rapid access to test a theory immediately and get some quick feedback. Similarly work in software defined networking and science DMZ is important to get the data where it needs to be.

Answer 2: In addition to the traditional Advanced Cyberinfrastructure components i.e. HPC, Big Data clusters, Data storage, software, networking and cybersecurity, we seeing two new avenues of infrastructure rapidly evolving to meet different subset of scientific needs. First would be private research Cloud platforms which are build locally to institutions to do local model development by self-provisioning environments suitable for their ad-hoc needs. These clouds can also allow containerization of several applications that are usually very domain specific and can save massive amount of time required for installation and optimizations. Second components is going to be secure compliant HPCC. As federal agencies collaborate on initiatives such as Precision Medicine and BRAIN, eventually vast amount of -omic datasets will overlapped with other identifiable clinical datasets to paint a holistic picture of a patient. Currently, there is no specific NSF program that facilitate creation of such secure HPC environments that can be used to conduct sensitive research by complying with regulations such as HIPAA and FISMA etc.

**Question 3** Other considerations (maximum ~1200 words, optional): Any other relevant aspects, such as organization, process, learning and workforce development, access, and sustainability, that need to be addressed; or any other issues that NSF should consider.

Answer 1: It is critically important that data and resources remain available, that scientists can travel freely, and political interference is minimized in the scientific process.

Answer2: Workforce development remains the biggest challenge where NSF provides limited support to cyberinfrastructure providers for understanding the national trend of scientific needs and equipping themselves with up to date technologies to be able to effectively respond to those emerging trends. It is imperative, that NSF facilitates workforce development by expanding the current workshop programs (such as XSEDE) at various regions. Additionally, NSF should facilitate more software writing workshops for HPC and Big Data environments where cybe rinфраstructure providers have gain a deeper appreciation of these technologies than merely hosting the environments but also train researchers and research students at their local institutions and showcase how these technologies can transform their research. Something as simple as putting together an inventory of scientific use cases that are running on NSF funded infrastructure with details about the platform, technologies involved and strategies to bring academic middle-missing disciplines to the HPC world.

## Consent Statement

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